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This report describes the risk analysis performed for the Defense Standard Ammunition Computer System (DSACS). Cross-impact analysis and goal programming were employed to encoded probabilities for subsystems. These subsystem probabilities were used as input to a Monte Carlo simulation which estimated probabilities of the system meeting its various objectives.

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# DEFENSE STANDARD AMMUNITION COMPUTER SYSTEM (DSACS) RISK ANALYSIS REPORT


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Systems Analysis Office
Rock Island, IL 61299-6000


July 1988

FINAL REPORT FOR PERIOD JANUARY 1988 - JULY 1988

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U.S. Army Armament, Munitions and Chemical Command
Materiel Management Directorate
Rock Island, IL 61299-6000

# SUMMARY


This report discusses the risk analysis for the Defense Standard Ammunition Computer System (DSACS).

Using a nonlinear goal programming technique, probabilities were developed for each possible scenario of subsystems either providing or failing to provide their functions. Input for the technique consisted of:

1. The interdependence of functions performed by the various DSACS subsystems.
2. The expert opinion of functional area personnel as to the probability of the various DSACS subsystems performing their functions.

These subsystem scenario probabilities were used as input to a Monte Carlo simulation, which estimated probabilities for DSACS meeting its various objectives.

DSACS was divided into two groups of subsystems, those supporting planning and execution and a group of smaller stand alone subsystems. With the exceptions of Industrial Preparedness Planning and Maintenance the stand alone subsystems all have a high probability of success. Completion of the Industrial Preparedness Planning subsystem is dependent on development of a relational data base management system, which will take at least 2 years to develop. The probability the Maintenance subsystem being a usable system, by July 89, is 0.5.

The odds against DSACS developing a system capable of performing planning and execution functions for the entire ammunition base, by Oct 88, are at least 5 to 2. However, some items could be processed using a mixture of automation and manual effort, if certain critical functions in CAPE, MIP and Pricing are provided. Formal walk around procedures should be developed for those functions which can be performed manually. Based on the number of personnel available to support these function, a determination should be made as to the number of items the system can reasonably be expected to process, by Oct 88.

Priority should be given to developing those functions which directly interface with SMCA customers. This includes all of CAPE and the on-line inquiry functions of Order Tracking.

CAPE and the PWD generation function of MIP are critical elements in the development of any type of planning and execution system, since they are essential, have a high probability of failure and no substitute is available for the functions they perform.

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## TABLES

1. Introduction

a. Background

The Defense Standard Ammunition Computer System (DSACS) was designed to improve the planning, administration and management of conventional ammunition. The system includes a number of migrations of existing software systems as well as new development. The primary technique employed for new development has been rapid prototyping. Although, development of the system began in FY 83, the system analysis office (AMSMC-SA) was not requested to perform a risk analysis until May 87. A networking approach was first selected as the method of performing this analysis. However, attempts to develop the data required for this method failed. Various software cost estimating models, such as COCOMO and System 3, were also considered but none were acceptable to both the PM for DSACS and AMSMC-SA. These parametric models were based on data from software projects which used a structured approach to system design. Also, the estimates produced by these models were to sensitive to qualitative, poorly defined variables or the models were driven by variables which could not be estimated accurately.

(1473 Keywords) —

b. Objective

The objective of the analysis was to identify unacceptable combinations of probability of failure and consequence of failure for the various functional areas of DSAC, as currently defined.

c. Sources of Data and Assumptions

The data used in this analysis were based on the expert opinions of personnel familiar with the methods and procedures DSACS proposes to employ as well as the existing procedures employed to satisfy the information requirements of conventional ammunition procurement and logistics support. These experts were selected by the AMCCOM Directorates having responsibility for the functions that will be performed by DSACS's various subsystems. The primary assumption was that the personnel providing data have the expertise to provide accurate assessments of the probability of DSACS performing its functions and the impact of functional failure on the system's objective. Two other main assumptions were that the functions provided by the various subsystems can be interlaced to perform DSACS's objectives and that an error free data base exists.

## 2. Methodology

The analysis was based on expert opinion. It assessed the impact of failures in the various DSACS functional areas on meeting the project's performance goals. This approach was used because of the fluid nature of systems specifications when using a prototyping approach to systems design, the lack of data on prior prototyping projects and the inability to obtain the data required to perform this analysis using a bottom up approach. The steps performed to execute this approach follow:

a. In conjunction with functional points of contact (POC), three sets of input data were produced.

(1). DSACS goals based on the global description and subsystem functional descriptions.

(2). A list of every possible scenario for the lowest level of each functional area. These scenarios were based on the success or failure of the subsystem to provide its major functions. For example, a subsystem with three major functions (A-C) would have the following 8 scenarios, where 0 is failure to provide a function and 1 is function provided.

| A | B | C | |
|---|---|---|---|
| 0 | 0 | 0 | No functions provided |
| 0 | 0 | 1 | |
| 0 | 1 | 0 | |
| 1 | 0 | 0 | Functionality |
| 0 | 1 | 1 | increases |
| 1 | 0 | 1 | |
| 1 | 1 | 0 | |
| 1 | 1 | 1 | All functions provided |

(3). Assessments of the impact on performance goals, of the failure of subsystems to perform their major functions. Emphasis was given to the ability of the system to function with manual effort substituted where DSACS fails to automated a function, by Oct 88.

b. Expert opinions of the marginal and first-order conditional probabilities of performance failures were elicited.

(1). Performance failure was based on individual subsystem functions.

(2). Marginal and first order conditional probabilities were provided as point estimates.

c. Probability assessments were made using a Monte Carlo simulation and goal programming techniques.

(1). Using the axioms of probability, we produced a set of internally consistent probabilities for each subsystem scenario, which had the least deviation from the elicited probabilities.

(2). The subsystem scenario probabilities were used as input to a Monte Carlo simulation, which estimated probabilities for system scenarios.

(3). The system scenarios, their probability estimates and impact assessments were used to identify the areas of greatest concern and areas needing further analysis.

This approach used Ireland's definition of risk [1] as "the resultant product of probability of failure and the consequence of that failure for any preset goal." However, we treated the consequence of failure and its probability in a more quantitative manner than Ireland. The primary tool we used to estimate probabilities was cross-impact analysis. In cross-impact analysis, expert judgments are solicited on the marginal and conditional probabilities of the occurrence of factors, which are then used to generate the probabilities of future scenarios. Sarin [2] [3] proposed a method of adjusting the elicited information to produce bounds for an internally consistent set of scenario probabilities. This method has been refined by DeKluyer and Moskowitz [4] using goal programming. We used a variation of the DeKluyver and Moskowitz method to estimate probabilities for the various subsystem scenarios, that are consistent with the axioms of probability. Using these probabilities, system scenarios were generated and their probabilities estimated with a Monte Carlo simulation. The system scenarios were used to determine the success or failure to meet the project's objectives and the causes of failure recorded. The formulation of the goal program is follows. The objective function sets a goal of minimizing the maximum deviation from the elicited probabilities (DIFF).

(1) MIN: DIFF

Constraint 2 and the nonnegativity conditions insure convexity.

(2) ST: Σ P[S(i)] = 1.0

Where P[S(i)] is the probability of scenario S(j), for j = 1 to n**2. Where n is the number of functions for the subsystem. Constraints 3 thru 5 insure additivity.

(3) Σ P[S(i) WITH F(1) = 0] = P[F(1) = 0]

.
.
.

(4) Σ P[S(i) WITH F(K) = 0] = P[F(K) = 0]

.
.
.

(5) Σ P[S(i) WITH F(N) = 0] = P(F(N) = 0)

Where F(i) is an index variable for the success or failure (1/0) to provide function i, for i = 1 to n. Constraints 6 thru 9 insure that the multiplication rule holds.

(6) $\Sigma$ P[S(i) WITH F(A) = 0 and F(B) = 0] = P[F(A) = 0|F(B) = 0] * P[F(B) = 0]

(7) $\Sigma$ P[S(i) WITH F(A) = 0 and F(C) = 0] = P[F(A) = 0|F(C) = 0] * P[F(C) = 0]

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.
.

(8) $\Sigma$ P[S(i) WITH F(K) = 0 and F(J) = 0] = P[F(K) = 0|F(J) = 0] * P[F(J) = 0]

.
.
.

(9) $\Sigma$ P[S(i) WITH F(N) = 0 and F(N-1) = 0] = P[F(N) = 0|F(N-1) = 0] * P(F(N-1) = 0]

Constraints 10 thru 17 relate adjustments in the elicited probabilities to the objective function.

(10) DIFF $\geq$ DP(A,A)

(11) DIFF $\geq$ DN(A,A)

.
.
.

(12) DIFF $\geq$ DP(N,N)

(13) DIFF $\geq$ DN(N,N)

(14) DIFF $\geq$ DP(A,B)

(15) DIFF $\geq$ DN(A,B)

.
.
.

(16) DIFF $\geq$ DP(N,N-1)

(17) DIFF $\geq$ DN(N,N-1)

Where DN(j,k) is a negative adjustment to a probability estimate and DP(j,k) is a positive adjustment to the estimate. Constraints 18 thru 21 define the probabilities of the subsystem failing to fulfill its various functions in terms of the elicited probabilities and variables which allow adjustments to be made to these estimates.

(18) P[F(A) = 0] - DP(A,A) + DN(A,A) = E(A,A)

.
.
.

(19) P[F(N) = 0] - DP(N,N) + DN(N,N) = E(N,N)

$$(20)\quad P[F(A) = 0 \mid F(B) = 0] - DP(A,B) + DN(A,B) = E(A,B)$$

$$\vdots$$

$$(21)\quad P[F(N) = 0 \mid F(N-1) = 0] - DP(N,N-1) + DN(N,N-1) = E(N,N-1)$$

Where $E(j,k)$ is a probability estimate. If j is equal to k, it is an estimate of the marginal probability of function j failing. Otherwise it is an estimate of function j failing given function k fails. This type of nonlinear goal programming problem can be solved using a constraint approximation method [5]. All summations are performed on the variable subscripted with an i.

This approach provides the basis for a management control mechanism by identifying the areas which are most likely to lead to a failure to meet DSACS objectives. The following results are produced:

a. A list of scenarios and probabilities for each subsystem under the current alternative.

b. The probability of meeting each DSACS objective with the current level of resources. The probability of meeting DSACS objectives with different mixes of resources could also be produced, by eliciting additional probability estimates.

c. A list of most likely causes of failure to meet each DSACS objective, in terms of subsystem functions.

## 3. Results

Based on interviews conducted with functional area personnel during the period 25 March 88 thru 5 May 88, the analysis was divided into two areas, the subsystems supporting planning and execution functions and a group of smaller stand alone subsystems. Results for each of these groups are given below. The probabilities for the various subsystem scenarios are in the Appendix. Greater attention was given to the Maintenance (AH) subsystem than to the other stand alone subsystems, because it was the only one with a significant probability of failing.

a. Stand Alone Subsystems

(1) Transportation and Traffic Management (AM). The probability of this functional area performing all its functions, by Oct 88, is 0.9.

(2) Industrial Preparedness Planning(AL). The subsystems making up this functional area are complete except for the MOB production base analysis and allocation subsystem (ALG). The construction of this relational DBMS will take at least 2 more years.

(3) Quality Assurance (AG). This functional area is a stand alone system consisting primarily of migrations of existing systems, its probability of success, by Mar 89, exceeds .95.

(4) Contingency Planning (AQ). This functional area consists of an inhouse migration of existing systems into DSACS. The current SIMSCRIPT and FORTRAN programs will be translated into COBOL. This functional area does not interface with any other subsystem.

(5) Demands (AJ) - complete

(6) Demilitarization (AK) - complete

(7) Cataloging (AO) - complete

(8) Maintenance (AH). This functional areas consists of six subsystems which will be used to manage and operate a wholesale maintenance point for all facets of conventional ammunition. The probabilities for this system performing its various objectives, by July 89, are shown in Figure 1. The probability of the various functions of this subsystem being a fault when the functional area does not perform its objectives is given in Table 1. The key for the code used for functions in Table 1. is given in the Appendix.

FIGURE 1. PROBABILITY OF PERFORMING MAINTENANCE FUNCTIONS BY JULY 89

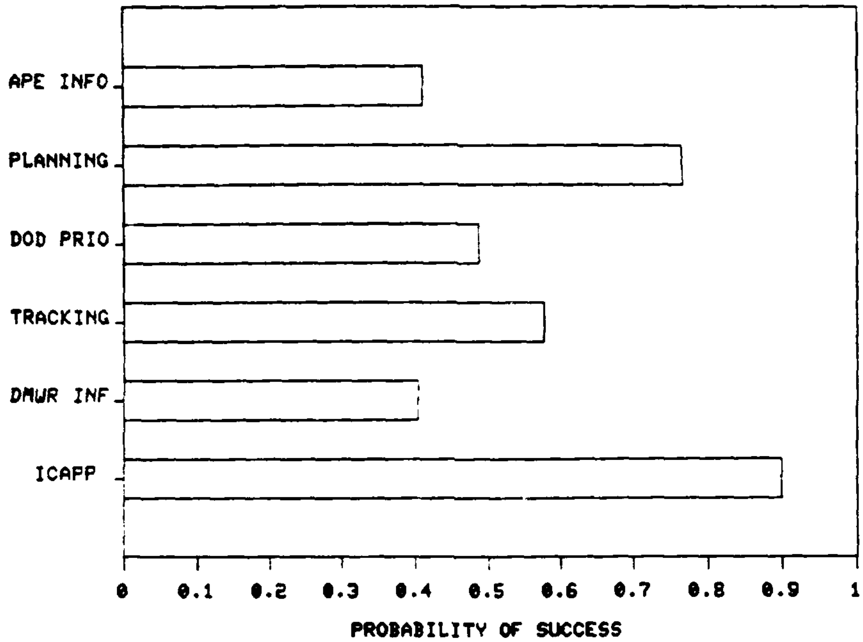



TABLE 1. CONDITIONAL PROBABILITIES MAINTENANCE

| FUNCTION CODE | ICAPP | DMWR INFO | TRACKING | DOD PRIORITY | PLANNING | APE INFO |
|---|---|---|---|---|---|---|
| AHA | 1.0 | .17 | .24 | .20 | .43 | .17 |
| AHB (1) | N/A | .49 | N/A | N/A | N/A | N/A |
| AHB (2)* | N/A | .00 | N/A | N/A | N/A | N/A |
| AHC (1) | N/A | .42 | .59 | .49 | N/A | .43 |
| AHD (1) | N/A | N/A | N/A | .29 | N/A | N/A |
| AHE (1) | N/A | .25 | .35 | .29 | .64 | .26 |
| AHE (2) | N/A | .25 | .35 | .29 | .64 | .26 |
| AHE (3) | N/A | .25 | .35 | .29 | .64 | .26 |
| AHF (1) | N/A | N/A | N/A | N/A | N/A | .26 |
| AHF (2) | N/A | N/A | N/A | N/A | N/A | .26 |

* This function may be performed manually. The probability it would have to be performed manually is 0.29.

b. Planning and Execution.

The primary analysis of this group of subsystems was confined to planning for the Program Objective Memorandum (POM), planning for Foreign Military Sales (FMS), Military Interdepartmental Purchase Request (MIPR) execution, FMS execution and order tracking. The subsystems, which provide these capabilities are Major Item Plan (MIP), Pricing, SMCA Review and Execution (SMCA), Customer Acquisition Plan Entry (CAPE), Program and Funds Receipt and Release (PFRR), Order Tracking, CAWCF Budget and Production Surveillance and Scheduling (PS&S). Analysis of the probability of fulfilling these objectives with a mix of automated and manual processing was completed, under the following three assumptions.

(1) Baseline. The probabilities generated from interviews with functional personnel were used with out any new assumptions.

(2) With Customer Acquisition Plan Entry (CAPE). The probabilities generated from interviews with functional personnel were used for all subsystems except CAPE. CAPE was assumed to function at 100 percent .

(3) With CAPE and Procurement Work Directive (PWD) Generation. The probabilities generated from interviews with functional personnel were used for all subsystems except CAPE and the PWD generation functions of the Major Item Plan (MIP) subsystem. These subsystems were assumed to function at 100 percent .

With the exception of order tracking, the probability of DSACS providing any of these objectives, by Oct 88, is very low (see figure 2). However, if the two major problem areas, CAPE and PWD generation, are corrected DSACS has a reasonable probability of fulfilling these objectives with a mix of automated and manual processing.

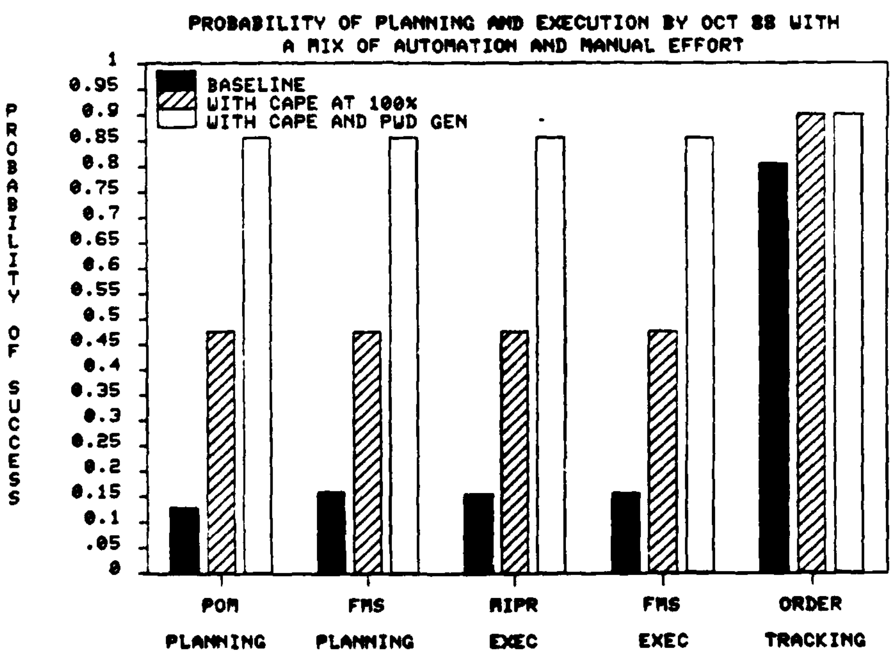
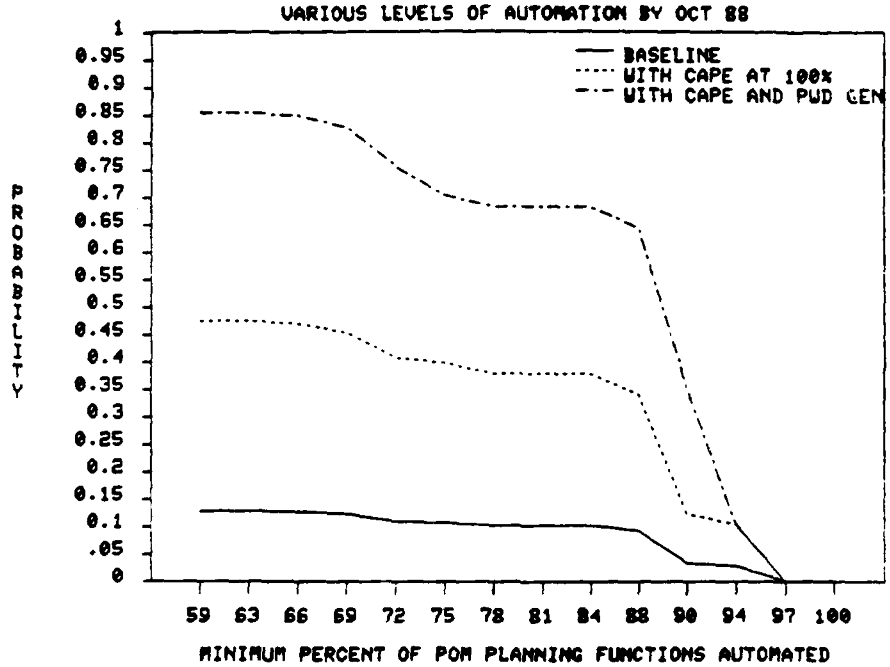



FIGURE 2. PLANNING AND EXECUTION

Various mixes and their probabilities are provided in Figures 3 and 4. The probabilities referred to in these figures are the probabilities of having the ability to perform planning and execution functions with at least a given percentage of the process automated.

PROBABILITY OF POM PLANNING WITH
VARIOUS LEVELS OF AUTOMATION BY OCT 88




PROBABILITY OF FMS PLANNING WITH VARIOUS
LEVELS OF AUTOMATION BY OCT 88

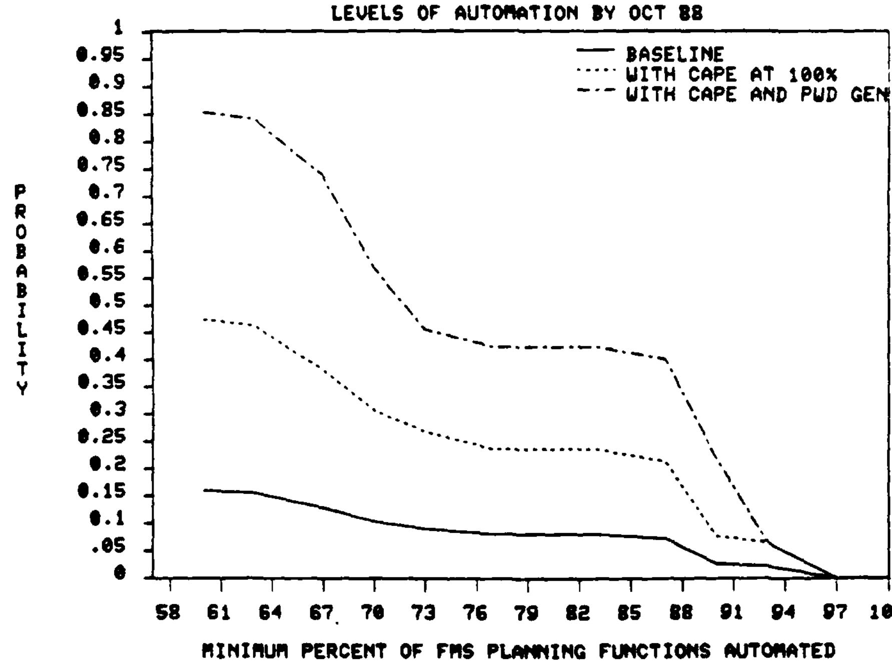
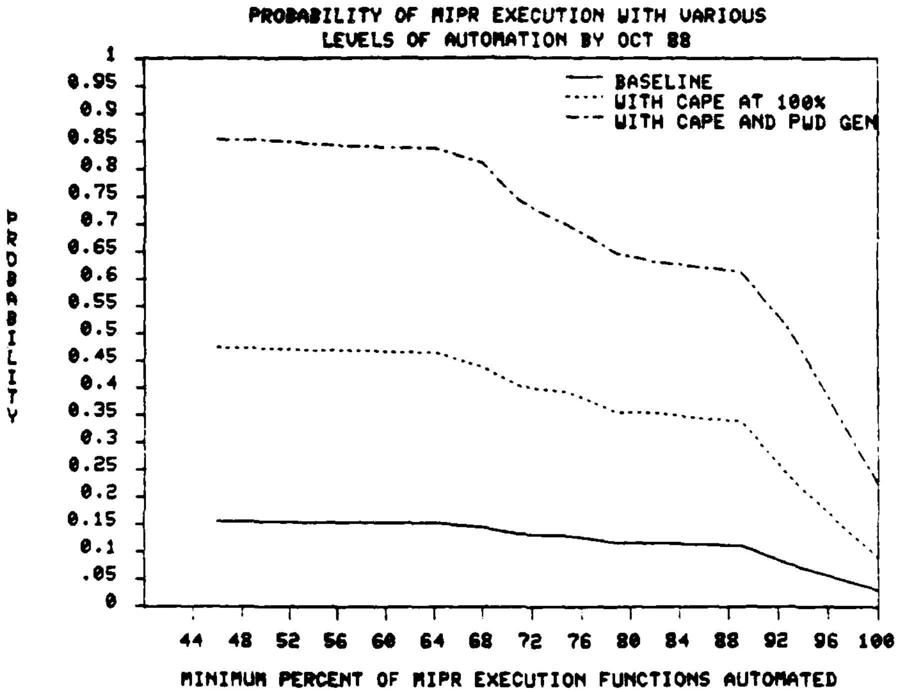



FIGURE 3. MIXES OF AUTOMATION FOR PLANNING FUNCTIONS



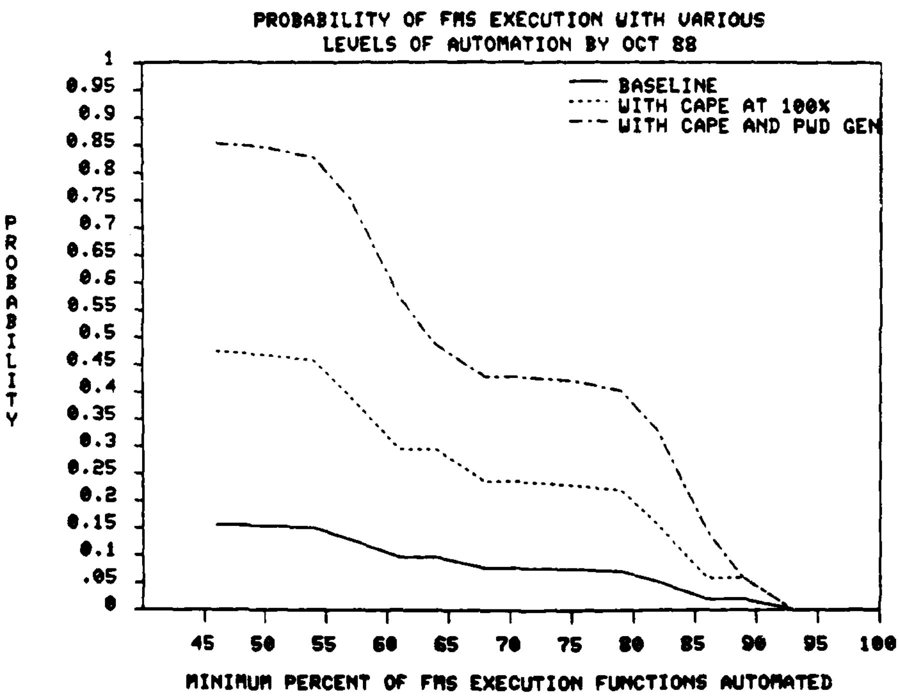




FIGURE 4. MIXES OF AUTOMATION FOR EXECUTION

Table 2. lists critical functions for planning and execution objectives and the probability of these functions being a fault given that the system fails. Functions supporting planning and execution are categorized as critical if they are required to meet an objective and no suitable substitute is available.

TABLE 2. CRITICAL FUNCTIONS FOR PLANNING AND EXECUTION

| SUBSYSTEM | FUNCTION CODE | PLANNING POM | PLANNING FMS | EXECUTION MIPR | EXECUTION FMS | TRACKING |
|---|---|---|---|---|---|---|
| CAPE | ARA (1) | N/A | N/A | N/A | N/A | .05 |
| CAPE | ARA (2) | N/A | N/A | .47 | .47 | N/A |
| CAPE | ARA (3) | .11 | .12 | .12 | .12 | .51 |
| CAPE | ARA (4) | .12 | .12 | N/A | N/A | N/A |
| CAPE | ARA (5) | .12 | .12 | .12 | .12 | N/A |
| CAPE | ARA (6) | .17 | .18 | .18 | .18 | N/A |
| CAPE | ARA (7) | .01 | .01 | .01 | .01 | N/A |
| CAPE | ARA (8) | .23 | N/A | .24 | .24 | N/A |
| CAPE | ARA (9) | .12 | .12 | N/A | N/A | N/A |
| CAPE | ARA (10) | .46 | .48 | N/A | N/A | N/A |
| MIP | AIB (1) | .01 | .01 | .01 | .01 | N/A |
| MIP | AIB (3) | .11 | .12 | .12 | .12 | N/A |
| MIP | AIB (5) | .57 | .59 | .59 | .59 | N/A |
| MIP | AIB (7) | .00 | .00 | .00 | .00 | N/A |
| Pricing | AIC (1) | .06 | .06 | N/A | N/A | N/A |
| Pricing | AIC (2) | .06 | .06 | .06 | .06 | N/A |
| Pricing | AIC (3) | .06 | .06 | N/A | N/A | N/A |
| Pricing | AIC (4) | .06 | .06 | .06 | .06 | N/A |
| Pricing | AIC (5) | .06 | .06 | N/A | N/A | N/A |
| Pricing | AIC (6) | .06 | .06 | N/A | N/A | N/A |
| Pricing | AIC (8) | .06 | .06 | N/A | N/A | N/A |
| Tracking | ADC (3) | N/A | N/A | N/A | N/A | .50 |

Table 3. lists functions which can be performed manually and the objectives they support. The probability of success for these functions can be found in the Appendix.

TABLE 3. NON CRITICAL FUNCTIONS FOR PLANNING AND EXECUTION

| SUBSYSTEM | FUNCTION CODE | PLANNING POM | PLANNING FMS | EXECUTION MIPR | EXECUTION FMS | TRACKING |
|---|---|---|---|---|---|---|
| Tracking | ADC (1) | | | | | X |
| MIP | AIB (2) | X | X | X | X | |
| MIP | AIB (4) | | | X | X | |
| MIP | AIB (8) | X | X | X | X | |
| MIP | AIB (9) | X | X | X | X | |
| PS&S | AIF (1) | X | X | | | |
| PS&S | AIF (2) | X | X | | | |
| CAWCF | AII (1) | | | X | X | |
| CAWCF | AII (2) | | | X | X | |
| PFRR | AP (1) | | | X | X | |
| PFRR | AP (2) | | | X | X | |
| PFRR | AP (3) | | | X | X | |
| SMCA | ARB (1) | X | X | | | |
| SMCA | ARB (2) | X | X | | | |
| SMCA | ARB (3) | X | X | | | |
| SMCA | ARB (4) | X | X | | | |
| SMCA | ARB (5) | X | X | | | X |
| SMCA | ARB (6) | X | X | | | |
| SMCA | ARB (7) | X | X | | | |
| SMCA | ARB (8) | X | | | | |
| SMCA | ARB2 (1) | | | X | X | |
| SMCA | ARB2 (2) | | | X | X | |
| SMCA | ARB2 (3) | | | X | X | |
| SMCA | ARB2 (4) | | | X | X | |
| SMCA | ARB2 (5) | | | X | X | |
| SMCA | ARB2 (6) | | | X | X | |
| SMCA | ARB2 (7) | | | X | X | |

On 23 June 88, the Deputy for Resources and Management (DRM) and the Project Manager were formally briefed on the results of the analysis. Because a number of plans designed to increase the probability of success were under way, DRM directed AMSMC-SA to update a portion of the analysis in July 88. The portion of the analysis dealing with POM Planning and MIPR Execution was update, based on interviews conducted during the period 13 July 88 thru 18 July 88. The results are provided in Table 4. together with the prior results. Based on the July 88 interviews, the PWD Generation function of MIP was no longer categorized as critical, since its function can be performed manually. The reclassification of PWD Generation was the major cause of the increase in probabilities of success rather than

changes in probabilities for subsystems. Probability estimates for all subsystems remained the same, with the exception of the Major Item Plan subsystem. These estimates were based on planning and execution with a mix of automation and manual effort, by Oct 88. Even if DSACS provides the capability to support POM Planning and MIPR Execution many of the required functions would have to be performed manually.

TABLE 4. PROBABILITIES OF SUCCESS FOR PLANNING AND EXECUTION

| | PROBABILITY OF SUCCESS | |
|---|---|---|
| OBJECTIVE | MAY 88 | JULY 88 |
| POM Planning | 0.13 | 0.23 |
| FMS Planning | 0.16 | 0.28 |
| MIPR Execution | 0.16 | 0.28 |
| FMS Execution | 0.16 | 0.28 |
| Order Tracking | 0.80 | 0.80 |

CONCLUSIONS and RECOMMENDATIONS

It is unlikely that DSACS will be able to support planning and execution functions for 100 percent of the ammunition base, by Oct 88. However, some number of items could be processed using a mixture of automation and manual effort, if the critical functions listed in Table 2 are provided. Formal walk around procedures should be developed for the functions which can be performed manuallly (see Table 3.). Based on the number of personnel available to support these functions, a determination should be made as to the number of items the system can reasonably be expected to process, by Oct 88.

If a funding shortfall requires rationing of the remaining DSACS resources, first priority should be given to developing those functions which directly interface with SMCA customers. This includes all of CAPE and the on-line inquiry functions of Order Tracking. Second priority should be given to the remaining critical functions in MIP and Pricing. Development of the non-critical functions listed in Table 3. should be given the lowest priority for remaining resources.

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## APPENDIX

This Appendix contains probabilities for every possible scenario at the lowest level of each functional area.
These scenarios were based on the success or failure of the subsystem to provide its major functions. For example, a subsystem with three major functions (A-C) would have the following 8 scenarios, where 0 is failure to provide a function and 1 is function provided.

| A | B | C | |
|---|---|---|---|
| 0 | 0 | 0 | No functions provided |
| 0 | 0 | 1 | |
| 0 | 1 | 0 | |
| 1 | 0 | 0 | Functionality |
| 0 | 1 | 1 | increases |
| 1 | 0 | 1 | |
| 1 | 1 | 0 | |
| 1 | 1 | 1 | All functions provided |

If a scenario is not listed its probability is zero. To the right of each subsystem code is the symbol of the organization which provided estimates for the subsystem.

AD Procurement Execution

ADC Order Tracking - AMSMC-PD

TABLE 5. SCENARIO PROBABILITIES FOR ORDER TRACKING

| FUNCTIONS 4 2 3 1 | SCENARIO PROBABILITY |
|---|---|
| 0 0 0 0 | .00007 |
| 0 0 0 1 | .00001 |
| 0 0 1 0 | .00001 |
| 0 0 1 1 | .00001 |
| 0 1 0 0 | .00001 |
| 0 1 0 1 | .00001 |
| 0 1 1 0 | .00001 |
| 0 1 1 1 | .00987 |
| 1 0 0 0 | .00001 |
| 1 0 0 1 | .00001 |
| 1 0 1 0 | .00001 |
| 1 0 1 1 | .00987 |
| 1 1 0 0 | .00001 |
| 1 1 0 1 | .00987 |
| 1 1 1 0 | .00987 |
| 1 1 1 1 | .96035 |

(1) Maintain MIPR status information
(2) produce MIPR review reports
(3) provide on-line inquiry for the Services

(4) produce Qtr. Delinquency Reports

ADD Financial Interface -AMSMC-PD

This subsystem is still in the preliminary design stage. Its should be completed in late FY 89. Since it supports report generator activities only, it should have a high probability of success provided the systems which feed it perform.

(1) access cost control reports

(2) access acquisition tracking data

AG Quality Assurance -AMSMC-QA

This functional area consists primarily of migrations of existing systems. All of its functions have of probability of success of 1.0, with the exception of AGC (2) which can be performed manually. - AMSMC-QA

AGA Malfunction Investigation - AMSMC-QA

(1) provide an on-line update facility to the MIF

(2) provide an on-line query facility to the MIF

AGB Ammo Lot File - AMSMC-QA

(1) build and maintain the Ammo Lot File

(2) provide on-line query to selected information on the Ammo Lot FILE

AGC Ammunition Lot Reporting and Malfunction System (ALRAM) - AMSMC-QA

(1) provide for on-line maintenance of information stored

(2) provide for the controlled retrieval and formatting of on-line inquiries

AGD DATACOM - AMSMC-QA

(1) receive messages and related codes

(2) retain test data and provide on-line interrogation to all Services

AGE Suspension / Restriction - AMSMC-QA

(1) receive suspension and restriction notices

(2) provide on-line notification and query process to inform the Services of suspended or restricted items and appropriate storage facilities

AGF Quality Deficiency Reporting (QDR) - AMSMC-QA

(1) receive QDRs from the major subordinate commands

(2) maintain the QDRs file

(3) provide Deficiency Reports to all Services

AGG Contract History - AMSMC-QA

(1) receive and maintain contract/contractors' performance data

(2) generate contractors' performance ratings for use in future procurement actions

(3) provide Services with on-line query to contract history files

AH Maintenance - AMSMC-DS

AHA Integrated Conventional Ammunition Maintenance Plan (ICAPP) - AMSMC-DS

The probability of this subsystem performing is 0.9.

AHB Depot Maintenance Work Request (DMWR) Management Information System - AMSMC-DS

APPENDIX

TABLE 6. SCENARIO PROBABILITIES FOR DMWR INFO SYSTEM

| FUNCTIONS 1 2 | SCENARIO PROBABILITY |
|---|---|
| 0 0 | .08585 |
| 0 1 | .20715 |
| 1 0 | .20715 |
| 1 1 | .49985 |

(1) staff, approve, disseminate and update DMWR
(2) identify Ammunition Peculiar Equipment (APE) associated with a maintenance program

AHC Program Tracking - AMSMC-DS
(1) provide current information on maintenance progress as well as the dollars and man hours expended. The probability of providing this function is 0.75.

AHD Integrated DoD Priority for Minor Maintenance - AMSMC-DS
(1) facilitate the entry, evaluation and determination of maintenance priorities. The probability of providing this function is 0.85.

AHE Program Planning and Formulation - AMSMC-DS
The probability of this subsystem performing all its functions is 0.85. The probability of this subsystem not performing any of its functions is 0.15.
(1) evaluate initial plan and adjustments
(2) produce Planning and Formulation reports
(3) serve as the visible current Maintenance Plan

AHF Ammunition Peculiar Equipment (APE) Management Information System -AMSMC-DS

TABLE 7. SCENARIO PROBABILITIES FOR APE INFO SYSTEM

| FUNCTIONS 1 2 | SCENARIO PROBABILITY |
|---|---|
| 0 0 | .02250 |
| 0 1 | .12750 |
| 1 0 | .12750 |
| 1 1 | .72250 |

(1) maintain and store APE data
(2) provide APE data for decision making processes throughout the ammunition community

AI Procurement Planning

AIA ICAPP - AMSMC-PD

## APPENDIX

The probability of this subsystem performing is greater than 0.95.

(1) Generate ICAPP Reports

AIB Major Item Plan (MIP) - AMSMC-PD

(1) Component Breakout
(2) Component Breakout Make or Buy Committee Review
(3) Major Item Plan Development
(4) Contuinuing Resolution Authority
(5) Procurement Work Directive Generation
(6) Procurement Plan Development
(7) Major Item Plan Inquiry
(8) Report Requests
(9) History Selection

TABLE 8. SCENARIO PROBABILITIES FOR MIP

| FUNCTIONS 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | SCENARIO PROBABILITY |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0.00500 |
| 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.00250 |
| 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0.00250 |
| 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0.04500 |
| 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0.02500 |
| 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0.06333 |
| 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0.03667 |
| 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0.03667 |
| 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0.06167 |
| 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0.07666 |
| 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0.05166 |
| 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0.09834 |
| 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.02250 |
| 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0.02250 |
| 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0.06167 |
| 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0.01333 |
| 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0.02500 |
| 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0.00167 |
| 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0.09999 |
| 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0.02333 |
| 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0.00001 |
| 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0.08667 |
| 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0.13833 |

AIC Pricing - AMSMC-PD

APPENDIX

TABLE 9. SCENARIO PROBABILITIES FOR PRICING

| FUNCTIONS | | | | | | | | SCENARIO |
|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | PROBABILITY |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0025 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.0475 |
| 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0.0475 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.9025 |

(1) Actions pending price review
(2) Pricing reports function
(3) Pricing history function
(4) Pricing Statistical Analysis
(5) Pricing Administrative Support
(6) Base year price support function
(7) Status inquiry function
(8) Pricing support cost function

AID Industrial Stocks Management - AMSMC-PD

This functional area is not currently under development. Its functions can be performed manually.
(1) issue instructions for all off-line materiel movement requests
(2) provide reconciliation of consumption of industrial stock against current records
(3) provide demilitarization and disposal instructions for industrial stocks
(4) provide financial planning of PCH, CMS and disposal funds

AIE Workload Management - AMSMC-PD

This functional area is not currently under development. It functions can be performed using existing systems and manual effort.
(1) facilitate workload leveling
(2) provide workload/scheduling analysis
(3) provide 501 scheduling maintenance
(4) workload data base maintenance
(5) provide workload historical data

AIF Production Surveilance and Scheduling (PS&S) - AMSMC-PD

The probability of this system performing any functions, by Oct 88, is 0.0. Its functions can be performed manually.
(1) SCHEDULING
(2) SURVEILLANCE

AIH Industrial Readiness - AMSMC-PD

The function of this subsystem will be provided with an existing system.

AII CAWCF Budget - AMSMC-PD

The probability of this subsystem providing all its functions by Oct 88 is 0.9. The probability of it failing to provide any functions is 0.10.
(1) collect CAWCF data
(2) compile and generate reports

## APPENDIX

AJ Demands (complete) - AMSMC-DS

(1) provide wholesale requisition processing
(2) provide releases from reserve stock
(3) provide referrals to Inventory Control Points (ICPs)
(4) provide retail assets availability
(5) provide interchangeability
(6) provide cancellations
(7) provide storage site selection

AK Demilitarization (complete) - AMSMC-DS

(1) ensure current demail/disposal inventories
(2) maintain data base file
(3) provide mechanized system for reporting munition assets requiring demilitarization
(4) serve as a record of demil assets awaiting shipment or in transport
(5) provide mechanized records and visibility of status for demil / disposal plans
(6) provide visibility of specific shipments to SMCA during the past year

AL Industrial Preparedness Planning - AMSMC-IR The subsystems making up this functional area are complete except for ALG. The construction of this relational DBMS will take at least 2 more years.

ALG MOB Production Base Analysis & Allocation - AMSMC-IR
(1) develop MOB Production Base Plan (PBP)
(2) replace existing MOB PBPs with new MOB PBPs

ALC Production Base Improvement Actions - AMSMC-IR
(1) develop Industrial Preparedness Measures (IPM)
(2) update Industrial Preparedness Measures (IPM)

ALE Production Base Equipment - AMSMC-IR
(1) identify Plant Equipment Packages (PEPs)
(2) update the PEP data base
(3) identify voids that exist in the PEPs

AM Traffic Management - AMSMC-TM

AMA Intransit Processing - AMSMC-TM

## APPENDIX

### TABLE 10. SCENARIO PROBABILITIES FOR INTRANSIT PROCESSING

| FUNCTIONS 1 2 3 | SCENARIO PROBABILITIES |
|---|---|
| 0 0 0 | 0.05 |
| 1 1 0 | 0.05 |
| 1 1 1 | 0.90 |

(1) formulate transportation planning and RESHIP messages
(2) provide an automated process for retrieving and developing transportation related data
(3) provide an automated process for reconciling the ocean cargo manifest data and intransit visibility file

AMB Item Related Transportation Data (complete) - AMSMC-TM
(1) assure that the values for certain data elements in the DSACS Shipment Planning File are equal to the values in CCSS files and are updated as CCSS is updated
(2) enhance other DSACS modules by providing accurate palletization and transportation related data

AMC Transportation Query Processing (complete) - AMSMC-TM
(1) provide DSACS with the ability to receive queries from any remote terminal on the DSACS network
(2) provide DSACS network customers with the proper response to their queries

AME Production Data Process (complete) - AMSMC-TM
(1) provide visibility of CAWCF MROs to the traffic manager
(2) provide an automated process for retrieving transportation related data
(3) compute pieces, weight and cube to be used in the production report and the Volume Movement Report (VMR)
(4) provide a Production Data Report

AO Cataloging (complete) - AMSMC-DS

AOA CCSS Interface
AOB Depot Interface

AP Program and Funds Receipt and Release - AMSMC-CP

None of these functions will be provided for FMS, by Oct 88. FMS transactions can be processed manually.

APPENDIX

TABLE 11. SCENARIO PROBABILITIES FOR SMCA

FUNDED RECEIPT AND RELEASE

| FUNCTIONS | | | PROBABILITY | |
|---|---|---|---|---|
| 1 | 2 | 3 | ARMY | MIPR |
| 0 | 0 | 0 | .0025 | .0001 |
| 0 | 1 | 1 | .0475 | .0099 |
| 1 | 0 | 0 | .0475 | .0099 |
| 1 | 1 | 1 | .9025 | .9801 |

(1) Record Funded Programs Received by Command Electronically
(2) To Electronically Process 1300
(3) To Electronically Update MIP with AMSMC-CP Data elements

AQ Contingency Planning - AMSMC-DS

This functional area consists of an inhouse migration of existing systems into DSACS. The current SIMSCRIPT and FORTRAN programs will be translated into COBOL. This functional area does not interface with any other area.

(1) act on exercise requisitions for all Services
(2) automate flow planning for the wholesale inventory for all Services
(3) accumulate, process and draft shipment plans for edit and approval supply actions for transmittal
(4) determine ammunition readiness posture

AR Acquisition Planning

ARA Customer Acquisition Plan Entry (CAPE) - AMSMC-PD

The functions of this subsystem are independent. The probability of DSACS performing them, by Oct 88, is given after each functions. These functions can not be performed manually.

(1) Customer plan inquiry (.99)
(2) Execution (.6)
(3) Customer review/approval (.90)
(4) SMCA plan submission (.90)
(5) Customer plan clauses entry (.90)
(6) Technical data plan entry (.85)
(7) Allocate customer furnished material entry (.99)
(8) Delivery schedule entry (.80)
(9) Customer acquisition plan entry (.90)
(10) Customer planning (.60)

ARB SMCA REVIEW - AMSMC-DS

## APPENDIX

TABLE 12. SCENARIO PROBABILITIES FOR SMCA REVIEW

| FUNCTIONS 1 2 3 4 5 6 7 8 | PROBABILITIES DOD | FMS & OTHERS |
|---|---|---|
| 0 0 0 0 0 0 0 0 | .01000 | .01000 |
| 0 0 0 0 0 0 0 1 | .03000 | .24103 |
| 0 0 0 0 0 0 1 1 | .16000 | .24897 |
| 1 1 1 1 1 1 1 1 | .80000 | .50000 |

(1) Plans Pending SMCA Review
(2) Plans Pending Engineering Services Review
(3) Materiel Management Review Process
(4) Cataloging
(5) Acquisition Plan Inquiry
(6) Final Review
(7) SMCA Report Forms
(8) SMCA Budget Submission

ARB2 SMCA EXECUTION - AMSMC-DS

The probability of this subsystem performing all its functions for DOD transactions is 0.80. The probability of it performing none of its DOD functions is 0.20. The probability of it performing all its transactions for FMS and others is 0.50. The probability of it performing none of its functions for FMS and others is 0.50.

(1) Program Execution Orders Pending
(2) Orders Pending Acceptance
(3) Order Review / Tracking
(4) Program Execution SMCA Response
(5) Army Material Management Review
(6) SMCA Execution Forms
(7) SMCA Remarks Screen

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